What is claimed is:

1. A low-noise optical frequency converter, comprising:

a frequency converter that uses a predetermined microwave electric signal to modulate an input light wave and output a light wave that includes a first-order upper-sideband or lower-sideband and a third-order lower-sideband or upper-sideband,

the frequency converter including a first constitution for modulating a light wave identical to the input light wave with a signal having an angular frequency that is three times that of the microwave electric signal to form a first light wave having a first-order lower-sideband or upper-sideband, and a second constitution for mixing the first light wave with a second light wave having a first-order upper-sideband or lower-sideband and a third-order lower-sideband or upper-sideband, with a phase of the third-order lower-sideband or upper-sideband reversed to a phase of the first light wave, the second constitution having a function of suppressing third-order sidebands.

2. A low-noise optical frequency converter, comprising:

a light wave input section;

a modulation signal input section;

a modulated light wave output section;

a Mach-Zehnder interferometer type SSB modulator for modulating a light wave input to the light wave input section, provided with a first Mach-Zehnder interferometer type optical modulator and a second Mach-Zehnder interferometer type optical modulator on respective optical paths;

means for inputting a fundamental wave of a predetermined microwave electric signal;

a circuit for generating a wave having a frequency that is triple a frequency of the fundamental wave;

means for adjusting an amplitude of the triple-frequency wave;

delay means that can adjust a phase difference between the fundamental wave and the triple-frequency wave;

means of mixing the fundamental wave and the triple-frequency wave and generating an output; and

means of applying the mixing means output to the modulation signal input section;

wherein a noise component arising from the fundamental wave of the microwave electric signal is suppressed by a light wave component produced by modulation of the mixing means output with the triple-frequency wave.

3. The low-noise optical frequency converter according to claim 2, wherein the mixing means and the means of supplying electricity to the modulation signal input section are constituted by a 90-degree hybrid that splits the mixed fundamental wave and triple-frequency wave into two signals having a phase difference of substantially 90 degrees.

4. A low-noise optical frequency converter, comprising:

a light wave input section;

a modulation signal input section;

a modulated light wave output section;

a Mach-Zehnder interferometer type SSB modulator for modulating a light wave input to the light wave input section, provided with a first Mach-Zehnder interferometer type phase modulator and a second Mach-Zehnder interferometer type phase modulator on respective optical paths;

a first electrode for controlling a phase of a light wave provided on the first Mach-Zehnder interferometer type phase modulator;

a second electrode for controlling a phase of a light wave provided on the second Mach-Zehnder interferometer type phase modulator;

a third electrode for controlling a phase of a light wave propagating through each arm of the Mach-Zehnder interferometer type SSB modulator;

means for inputting a predetermined microwave electric signal;

means of splitting the microwave electric signal into two signals having a phase difference of substantially 90 degrees; and

means of applying the two signals to the modulation signal input section;

wherein a noise component included in an output of the Mach-Zehnder interferometer type SSB modulator generated by the phase difference between the two signals having the phase difference of substantially 90 degrees is suppressed by adjusting a bias voltage applied to the third electrode in accordance with the phase difference between the two signals.

5. A low-noise optical frequency converter, comprising:

a light wave input section;

a modulation signal input section;

a modulated light wave output section;

a Mach-Zehnder interferometer type SSB modulator for modulating a light wave input to the light wave input section, provided with a first Mach-Zehnder interferometer type phase modulator and a second Mach-Zehnder interferometer type phase modulator on respective optical paths;

a first electrode for controlling a phase of a light wave provided on the first Mach-Zehnder interferometer type phase modulator;

a second electrode for controlling a phase of a light wave provided on the second Mach-Zehnder interferometer type phase modulator;

a third electrode for controlling a phase of a light wave propagating through each arm of the Mach-Zehnder interferometer type SSB modulator;

means for inputting a fundamental wave constituting a predetermined microwave electric signal;

means for generating a wave having a frequency that is triple a frequency of the fundamental wave;

delay means that can adjust a phase difference between the fundamental wave constituting the microwave electric signal and the wave having a frequency that is triple a frequency of the fundamental wave;

means of mixing the fundamental wave and the triple-frequency wave and splitting the mixed wave into two signals having a phase difference of substantially 90 degrees; and

means of supplying electricity to the input section to which is input a signal used for modulating the signals;

wherein a noise component included in an output of the Mach-Zehnder interferometer type SSB modulator generated in accordance with the phase difference between the two signals having a phase difference of substantially 90 degrees is suppressed by adjusting a bias voltage applied to the third electrode in accordance with the phase difference between the two signals.

6. The low-noise optical frequency converter according to claim 4, wherein the means of splitting the mixed fundamental wave and triple-frequency wave into two signals having a phase difference of substantially 90 degrees is a 90-degree hybrid.

7. The low-noise optical frequency converter according to claim 5, wherein the means of splitting the mixed fundamental wave and triple-frequency wave into two signals having a phase difference of substantially 90 degrees is a 90-degree hybrid.

8. The low-noise optical frequency converter according to claim 4, wherein the predetermined microwave electric signal is a microwave electric signal with a periodically changing frequency, with a frequency of output light changing in accordance with the frequency of the microwave electric signal.

9. The low-noise optical frequency converter according to claim 5, wherein the predetermined microwave electric signal is a microwave electric signal with a periodically changing frequency, with a frequency of output light changing in accordance with the frequency of the microwave electric signal.

10. The low-noise optical frequency converter according to claim 6, wherein the predetermined microwave electric signal is a microwave electric signal with a periodically changing frequency, with a frequency of output light changing in accordance with the frequency of the microwave electric signal.

11. The low-noise optical frequency converter according to claim 7, wherein the predetermined microwave electric signal is a microwave electric signal with a periodically changing frequency, with a frequency of output light changing in accordance with the frequency of the microwave electric signal.

12. The low-noise optical frequency converter according to claim 8 that includes a constitution wherein the predetermined microwave electric signal is a microwave electric signal having a frequency that changes on a time basis, a correspondence between the frequency and an optimum value for suppressing the noise component to which a bias voltage inside the Mach-Zehnder interferometer type SSB modulator is adjusted based on the frequency is obtained beforehand and the correspondence is used for adjusting to suppress the noise component.

13. The low-noise optical frequency converter according to claim 9 that includes a con3astitution wherein the predetermined microwave electric signal is a microwave electric signal having a frequency that changes on a time basis, a correspondence between the frequency and an optimum value for suppressing the noise component, to which a bias voltage inside the Mach-Zehnder interferometer type SSB modulator is adjusted based on the frequency, is obtained beforehand and the correspondence is used for adjusting to suppress the noise component.

14. The low-noise optical frequency converter according to claim 10 that includes a constitution wherein the predetermined microwave electric signal is a microwave electric signal having a frequency that changes on a time basis, a correspondence between the frequency and an optimum value for suppressing the noise component, to which a bias voltage inside the Mach-Zehnder interferometer type SSB modulator is adjusted based on the frequency, is obtained beforehand and the correspondence is used for adjusting to suppress the noise component.

15. The low-noise optical frequency converter according to claim 11 that includes a constitution wherein the predetermined microwave electric signal is a

microwave electric signal having a frequency that changes on a time basis, a correspondence between the frequency and an optimum value for suppressing the noise component, to which a bias voltage inside the Mach-Zehnder interferometer type SSB modulator is adjusted based on the frequency, is obtained beforehand and the correspondence is used for adjusting to suppress the noise component.